1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

on the owner's generosity, but no man who expects to call on friends again can afford to be stingy in his food division. The amount of food in each share is slightly increased for the more laborious types of roof thatching.

The same method of contracting is used today in building the slat walls for a modern house. The space between the uprights is divided into sections (here called *maiova*), and one food share is set aside for those who complete a section (*puipui no maiova*). The food division at which the shares are handed out to the workers is termed *ngaluenga*. That this division may be made immediately the work is completed, the more farsighted arrange for it ahead of time by placing a tapu on their talo and nuts, and by fattening pigs. Others, not so far-seeing, wait until the work is completed before beginning to gather food, and the workers may have to wait patiently for some time before the payment is made. Informants seemed to think that a two-year wait would be the limit. If the owner showed no signs by this time of preparing his food division, it would be legitimate for the workers to make pointed comments about his stinginess. In any case, no man who was set all proud of his reputation in the community could afford to wait as long as two years.

There is no specialization in Pukapukan house building, and not the slightest suggestion of any guild organization. It is for this reason, perhaps, that an average-sized dwelling house takes from seven months to a year to build. The actual labor involved is not great, but the owners must frequently put aside work on the new house in order to engage in other activities. Delay is also caused by the necessity of laying in reserve food supplies to pay the workers in the next stage of construction. It is possible that the time taken to build a house today with iron tools (as also a canoe), is conditioned by the carry-over of temporal patterns from an earlier time when work was done with shell adzes and must of necessity have proceeded slowly. Also a work in hand gives a man a feeling that his time is valuable, and increases his importance in the community as one who has undertaken a work of magnitude and who is theoretically busy at this work when others may be idle.

There is no record in Pukapuka of any rites, tapus, chastities, prayers to the gods, or other ceremonies connected with house building. The completion of a new god house was marked by a feast, but there was no consecration of the house before it was used.

Canoe Building

There is no name for the expert canoe builder other than the general descriptive terms, *tangata mamatu* or *tangata tau waiva*, applied to any expert craftsman. Expertness in canoe building is associated with families of canoe builders by whom most of the canoes on the island are made.

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

322 Formerly wood was too precious for any man to risk failure and wastage of wood by building a canoe himself; and today, when most men consider themselves fairly skilled with the iron adz blade, the tendency is for the layman to make for himself only a rough dugout, retaining the services of the expert for his plank canoe. The following men are considered the expert canoe builders on the island today: in Ngake village, Tiele, Iti, Iliilia, Te Ingoa, Tualai, Veti; in Loto village, Pau and Nawaui; in Yato, Tuli. The men of the Ngake group are all related. Iliilia and Tualai began as helpers (*kau tuinga*) to Pau and Te Ingoa. They have since set themselves up as independent experts. Iti has just finished his first plank canoe which is generally conceded to be of the first quality. Hence Iti will soon be given his first commission, probably by a relative. Nawani is now too old to build canoes himself, but gives advice when required and is generally considered to have passed into the class of consulting experts. Tuli is the only man of his family group who is an expert. The largest canoe on the island (60 feet long, 13 seats) was built by Te Ingoa, believed by some to be the cleverest builder on the atoll today.

[501]

In general, a craftsman draws his assistants from his sons, brothers, or relatives, who serve voluntarily and are taught by the master all the skills of the craft, thus keeping the knowledge within the same family group. The assistants begin by sharpening the edges of the adzes as these are blunted and handed to them by the experts. They are given small jobs such as roughing out the shape of the stern piece, or making the preliminary adzing of the hull interior. Later they graduate to the more difficult finishing and fitting jobs where much skill is required to avoid bungling and wastage. In order to become a master, an apprentice must make himself a plank canoe. People come to watch his work, closely examine it from stage to stage, and entrust their own work to the would-be master craftsman only if the completed canoe passes a final criticism.

322 The chief craftsman directs all his assistants and is solely responsible
313 for the completed canoe. He selects from the bush the principal tree for the hull and the other trees necessary for hull and superstructure. The felling and rough trimming of these trees is done in the bush. Bark is removed and sections of trunk with short grain are set aside for the canoe hull, sections with longer grain for superstructure. Formerly the hull was roughly shaped in the bush by firing and adzing. Today this is done by adzing
322 only and the hull is carried or hauled to the shady place near the beach which has been set aside as a workshop. The place Matatoki on Loto beach was a well-known canoe-building yard in former days. Each expert has his own favorite workyard (*tonga vaka*) where canoe timbers may be slowly seasoned in the shade before use. Today the owner has his canoe built near his own house that he may more directly oversee the workmen's

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

322 285 labors. If this place is not shady, the owner erects a shade of coconut mats (*takapau*) on poles to protect workers and canoe timbers. Caulking material, lashing sennit, and canoe timbers are provided by the owner. The expert provides his own implements. (For the food financing and payment for the completed canoe, see p. 92).

322 554 461 Expert carpenters value their good name as quick workers and rarely dawdle over a job, because this would lay them open to criticism and would militate against further building contracts. As long as the expert and his assistants work conscientiously they are well fed. There are no songs or sayings about lazy carpenters, but a quick and skillful expert will be sure to have his name praised in a chant. Informants suggested that about one moon of continuous work with shell adzes was formerly required to finish an average-sized canoe.

322 531 Some experts possess a trade mark (*waka-mailonga*) which they carve roughly on the front of the bow piece of canoes they build. Such a mark is the head of a fish, the beak of a bird, or some other part of an animal. Tuaki puts a sign of two crossed hands on the wave guard (*malae puka*) of each canoe he builds.

552 Canoes may be named by their owners. An appropriate canoe name is *Te Mango* (Shark) or *Te Punga-o-Witi* (Coral-rock-of-Fiji). This name is mentioned to the people who attend the canoe-finishing feast (*inu kai waka-mailonga*) and the canoe is henceforth known and referred to by this name. Today some men roughly carve or paint the name on the bow of the canoe.

Canoe Crew

502 793 The canoe crew is known collectively as *matua vaka*. Specialized names for crew members of the flying-fish canoes have already been mentioned (p. 58). In general, the captain of the canoe crew is termed *tau muli vaka*. He is the steersman and leader of the crew. Formerly, especially for long distance voyages, he was usually a priest (*wata*). If he did not have priestly powers, one of his crew, who was a priest, consulted the gods in times of need.

502 The second member (*wuliwuli*) of the crew (moving from stern to bow) who sits on the aft cross boom (*kaukau ki muli*) is second in command and corresponds to mate. Should the captain die on a long voyage, he automatically takes command of the canoe. If the captain lays down his steering paddle to fish or rest, the *wuliwuli* takes up the steering. He helps to steer in strong seas or a high wind, and uses his paddle as a make-shift leeboard when the canoe is sailing by the wind. He further tends the main sheet (*aueue*) when the sail is up, watching wind pressure and direction.

The group of paddlers amidships are termed collectively *talani*. They are

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

502 charged with paddling the canoe and keeping it clear of water. In small canoes the man directly amidships is the bailer and is termed *tata yua*. The bowman is known as *hoxyu*. He is responsible for keeping a good lookout ahead, an especially important duty in shoal waters when he cons the canoe through the lagoon channels by directing the steering of the captain. He sits on the forward outrigger boom (*kaukau hi mua*) to keep the float down when the canoe is heeling over to a fresh wind. He alters the angle of the mast as required by the strength of the wind and uses his paddle as a leeboard if necessary. When it is necessary to turn the canoe quickly, he paddles at right angles to the canoe and thus helps the steersman. He is usually a strong, lively man as is demanded by his position.

322 782 562 778 793 Formerly tapus existed against the presence of women in canoes (p. 309) and against desecrating a canoe by capsizing it. When work began on a new voyaging canoe and again when the work was completed, a priest commended the canoe to the protection of the gods of the owner's paternal descent group. No details are remembered of these ceremonies, but they appear to have rendered the canoe in some measure tapu. Before starting a canoe voyage, the priest went to the worshiping place again to recommend the canoe to the protection of the god. No record is preserved of the type of god consultation carried out at sea, but informants suggested it was similar to consultations in the god house of the religious structure. The canoe priest probably took with him on the journey a stick or stone representative of his god to which a malo or coconut leaf could be tied when the priest communicated with the god. This would render the canoe still more sacred because in a sense the spirit of the god was considered as traveling with the priest on the canoe. To capsize a canoe by carelessness, lack of skill, or general bad temper was to treat the sacred canoe with less than proper consideration; it made the canoe *lapu* (violated the sanctity of a god), and the god was quick to punish this slight.

Care of Canoe

504 When canoes return from a fishing trip or other expedition, they are carried up the beach well above high-water mark and the hull, bow to the sea, is rested on chocks (*laugo*). Sections of pandanus logs are split into halves longitudinally. The flat side rests on the ground. A notch is cut in the rounded upper surface of the chock and the hull of the canoe rested in this notch. Dry butt ends of coconut midribs and dry half coconut husks are also used as canoe chocks. Stern and bow pieces may be further supported by dry coconut midribs, the broad end of the butt with its natural notch serving to support the canoe piece. Small canoes and dugouts are sometimes turned hull up before resting outrigger booms on chocks.

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

Payments

439 Mention has been made of services which are paid for. A man who
431 borrows a canoe gives fish in payment. A man who engages a medicine
476 man may make a return of food for his services. Distribution of food and
574 gifts accompany the building of a house or canoe:
554
[322]

When a man decides to have a canoe built and has assured himself of the necessary timber, he makes arrangements with his relatives to have a stocktaking of available food supplies. They then increase supplies deemed insufficient, by planting more talo, placing a prohibition over growing talo, and by acquiring more pigs which are fattened by a diet of coconuts. When the food is sufficient and has all been mobilized, the work is started. Groups of relatives assume responsibility for providing food day by day for the carpenters, bunches of nuts in the early morning and staple foods in the afternoon. The prospective owner of the new canoe is obliged to provide liberal quantities of food in order to avoid the reputation of stinginess and meanness. When the canoe is finished, it is launched and taken fishing for one or two days. This fishing is termed *wakeiyina te waka* (oiling the canoe). The biggest fish caught is given to the head carpenter, the remainder, after gifts (*matanga*) have been made to the chiefs, goes to the feast (*wakawaifanga*) for the canoe builders. A good catch of fish for the new canoe is called *wakeiyinaga matoto* (lucky oiling). At the final feast (*maifanga*) for the workers and for those who have assisted in providing food to finance the construction, every endeavor is made to have a great display of food. At this time gifts, depending on the size of the canoe and the wealth and status of the owner, are given to the builders. Average gifts in former times for a large canoe were: for each assistant carpenter, one fishing line of *vaso*, one anchor line of sennit, one paddle, and one pearl-shell fishhook; for the chief carpenter, the same in addition to one sennit mako and one fishing rod, preferably a bonito rod, complete with four or five bonito hooks.

[342] The amount of food distributed to recompense workers building or thatching a house depends on the size of the house.

For one average-sized sleeping house, 1,600 nuts, 800 *mamas* (talo puddings, each weighing about 8 ounces), and four pigs were provided; 100 nuts, 100 *mamas*, and one pig were distributed among the staff that killed and cooked the pig and prepared the talo; of the remainder each man and woman received two *pona* (pieces of pork 5 × 4 × 2 inches); each man received seven *mamas*, each woman five *mamas*, each child one *mama*; each man and woman received 20 nuts, each child one nut. This feast, originally prepared for the workers, who were drawn from the hymn-singing group (*pupu himene*) of the village, was divided among the village as a whole because of the great quantities of food. The owner of the house acquired increased status through this inclusion; everywhere remarks were made about his generosity.

262 To celebrate the completion of the present London Missionary Society church, each
574 village in turn feasted the whole island. These feasts were the largest that are remem-
431 bered within historic times on Pukapuka. Four talo puddings, each weighing about 3
621 pounds, were provided for each man and each woman; one pig for each man; 2,000
627 nuts for each man and each woman, with proportionately smaller amounts of all these foods for each child. Even though quantities were given away to a trading schooner that happened to be visiting the island, large amounts of the food were left to rot, proof that the time was one of great feasting and abundance.

Feasts are held in each village at Christmas time, when in alternate years groups of men and of women visit and dance in the villages away from home. Each village is host to these groups of visiting dancers, and provides food

1 n. [i.e., to prevent its being harvested--analyst.]

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

341 on one side of the roof, the other midrib on the other side. Where the roof
is low, leaflets at the butt end of each midrib are carried under the eaves
and tied to a thatch rafter. Where the roof is high, the weight of the
335 midribs is sufficient to hold down the roof securely. A number of these
double midrib slings are placed at intervals along the roof for added pro-
tection.

[177] House thatching with pandanus leaves was introduced into Pukapuka by
missionaries from Rarotonga. The method in use conforms in every par-
ticular to the Aitutaki method (26, pp. 11-24):

314 *Pandanus leaves are collected in the reserves, and straightened (uwe kawaka or*
322 *pepeke kawaka) by passing them around an upright stick (kokau uwe kawaka). The*
285 *leaves are then fastened in bundles (pekei kawaka) by placing the tip end of each leaf*
over the butt end and tying the ends of a number of leaves together. The leaves are
bent over and sewn to strips of wood split from the aerial roots of the pandanus. A
sewing needle (ne) is used to split the longitudinal grain of the pandanus leaves so
that the coconut leaf midribs (tuaaka) may be inserted to keep the leaves in position
on the wooden strip. The completed roof sheet is termed pale kawaka.

Framework Construction

341 Pandanus wood is used almost exclusively in the framework of the
336 *vaikoyamoa* type house. Formerly the wall posts were buried about 12
inches in the ground, but in a modern house of this type, four ground posts
are supported on low, grooved coral stones and the wall posts are fitted to
these ground posts by mortise and tenon joints. In the modern house the
tendency is also to fit together tiebeams, wall and roof plates with mortise
and tenon joints, but in the old house this would have required much labor
with shell adzes. House only the tops of the wall posts were grooved
(*waikaula pou*) to receive the wall plates, the heads of the rafters chipped
out (*waikatala*) to fit against the ridgepole, and roof plates grooved (*vaika-
kawau*) to fit against the tiebeams. If it is necessary to leave a house frame-
work unthatched for several days all the principal posts are wrapped with
coconut-leaf mats (*takapau*), and rafters are covered with a few coconut
midribs, to protect the timbers from rotting or warping in sun or rain.

Wall Mats

341 In old houses of the *vaikoyamoa* type, walls are made with coconut-leaf
285 mats (*takapau*). Mats are made long enough to overlap two wall poles,
284 the depth of plaiting for each mat being about 12 inches. In a typical house,
four mats form a set between each pair of wall poles. The mats are sup-
ported at their upper, midrib edges by two or three cords spaced
[171] equidistantly between the two edges. The method of support is the same
as the Samoan method (27, pp. 73-74, fig. 79). The mats operate on a Ven-

hBeaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

354
372
especially for evening prayers and for all-night vigils over a corpse. Out-of-doors light, on dark nights of the moon, is provided by small coconut-shell fires. When dry shells are plentiful a number of half shells are strung together on a strip of pandanus material (*lito*) about 2 to 3 feet long by passing one end of the pandanus strip through the soft eyehole of the half shell. Two parallel rows of these shells are placed on the ground and a few dry shells rested on top of the two rows. The shells are lit at the windward end with a *tauma'e* torch and burn with a fierce flame. Such a firelight torch of dry coconut shells is termed *lama ngaiyu*.

352
412
327
284

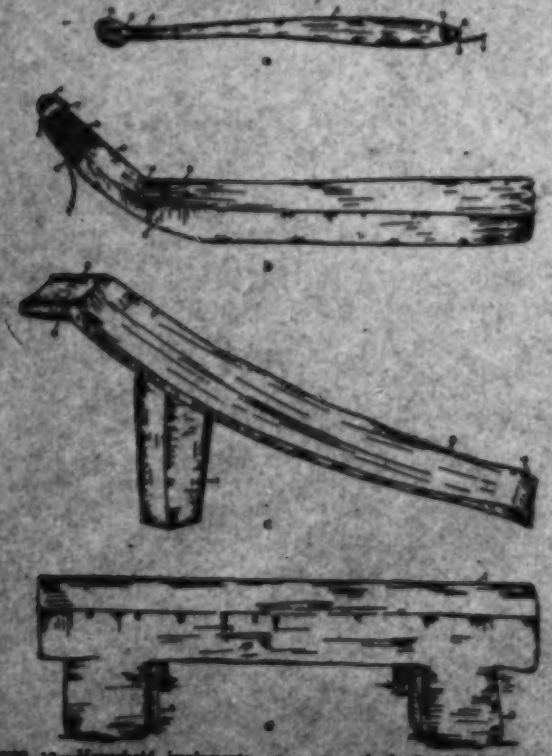


PLATE 22—Household implements. c, scraper (*ulupi*) (Olsby) for removing flesh in making coconut water container: handle of *ngaugau* wood (1) 15½ inches long, 1 inch thick at proximal end, and ½ inch thick at distal end; under surface of handle slightly concave longitudinally; distal end of handle inserted into carefully shaped hole

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

30?
412
322
284

in scraping shell (*vakyi*, *Nerita pulla*) a little to left of spiral wheel; four lashing turns of fine three-ply sennit braid (2) pass from handle through shell (a) where commencement end is buried, lashing continues with 16 transverse turns around distal end of handle (*a*); finishing of lashing buried beneath last turns; at proximal end a thin cord (7) of twisted sow fiber is attached so that the scraper may be hung up; two notches (*b*, *b*) cut in handle; the two plies of sow cord lapped about notch (5) and fastened with figure-of-eight turns of fine, two-ply twisted sennit which pass around handle and between two notches; free end of sennit coiled (8) around sow cord and finishing and buried. *b*, segment, stand grater (*toai*) (Ch106): clam-shell grater (1) mounted on wooden stand (2) cut from solid block of sow wood; horizontal base 1 foot 10½ inches long, 4½ inches wide at proximal end, and 2 inches thick; two triangular notches cut into proximal end said to be old form of ornament; oblique arm (3) 7 inches long, 3 inches wide, and 2 inches thick; angle (4) at which arm leaves horizontal base obtuse, under side (5) shaped and rounded off slightly; distal end of oblique arm (6) slotted for depth of 2 inches and concave so that convex outer surface of shell grater fits securely against arm; a piece of cork (7) fitted against inner concave surface of shell grater; lashing of three-ply braided sennit (8) applied over cork and around arm; lashing consists of 25 turns with buried commencement, and under normal conditions finishing end would also be buried, but in this grater free end is not cut off flush with transverse turns but is knotted and left free (9) so that grater may be hung up by free end. *c*, hack rest (*tokoi*) cut from solid block of unknown wood (Ch161): 1, four-sided stand 8½ inches high at back and 5½ inches high at front, sides about 2½ inches wide; 2, main backrest, surface of which has slight transverse and longitudinal concavity, 2 feet 3½ inches long, 9½ inches wide, and ¾ inch thick at edges; continued by horizontal extension rest (3) 4 inches long, ¾ inch thick at sides; 4, end resting on ground has bevel 1½ inches wide; 5, under surface of horizontal extension (3) shaped obliquely, coming together in short central longitudinal ridge 1¼ inches high. *d*, wooden headrest (*ulunga hakau*) (Ch184); roughly cut from single block of *pouhou* wood: 1, pillow section, 1 foot 7 inches long, 3 inches wide, and 2¾ inches thick; 2, four legs, each 2½ inches high, 2½ inches wide, and 2 inches thick; 3, slight flaw at base of right front leg due to established workmanship and not to design.

352 Furnishings of Pukapukan houses today include little that is modern.
573 Occasionally one sees a European chair. Most houses have wooden chests
484 or staircases in which clothes are kept. European mosquito nets are in com-
mon use, and several houses proudly display antique sewing machines.
171 Beyond these few articles and bundles of mats, the house interiors are generally quite bare.

FOOD UTENSILS

295 To harvest and husk coconuts, the climbing bandage (p. 146), husking
412 stick, and carrying pole are used. The husking stick (*koyo*, Ch049) of *ngongie*
482 wood is driven into the ground for two thirds of its length. Informants were sure that the short stick was the only type used formerly, the worker kneeling or squatting on the ground to husk. Today, a much longer stick is generally used, the husker standing and bending over the stick. The carrying pole (*ewe*) is a convenient length of coconut leaf midrib on which a nick is made at each end. Pairs of nuts are slung over the pole, the

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

[322/582] show variations on the type elliptical bowl. All bowls were carved from a solid block of wood. Large bowls used to prepare the talo foods for feasts are named after their makers.

912
415

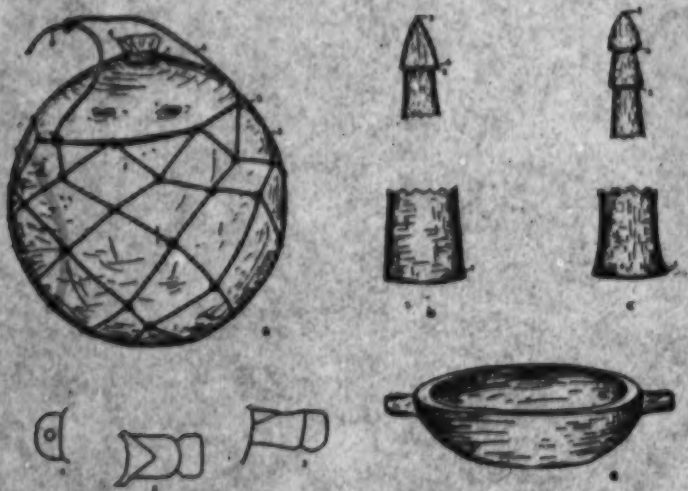


Figure 13.—Household equipment. *a*, coconut water container (*uouoagi*) (Cb92): cut eye (1) of large coconut (2) opened and enlarged; net (3) of two-ply twisted sennit cord encloses shell; handle (4) made by knotting three-ply braided cord to top of netting on either side and knotting another cord (5) to first one; *b*, cork (*uouoao*) a strip of dry pandanus leaf rolled into cone shape and stuffed with more pandanus leaves. *b*, talo pounder (*tuki*) of *ngangie* wood (Cb90): weight 4 pounds, length 1 foot 10 inches, diameter of base (1) 3⅝ inches, diameter of neck (2) 1¾ inches; distance from point of proximal end (3) to neck, 2⅝ inches; diameter of base (4) of cone-shaped proximal end 1⅛ inches; pounding base (1) flares slightly and is slightly convex; surface of pounder smooth. *c*, talo mixer (*pao*) of *ngangie* wood (Cb91): weight 3⅝ pounds, length 2 feet 4 inches, diameter of base (1) 3 inches, diameter of neck (2) 1 inch; length of first cone of proximal end from point (3) to base (4), 1⅜ inches; length from base of first cone (4) to base (5) of second truncated cone 1⅜ inches; distal end of mixer flares out and pounding surface is slightly convex. *d*, variant lugs of wooden bowls: 1, top view of left lug, 2 inches broad, 1 inch wide, and 1⅜ inches deep at bowl rim; hole, ⅜ inch in diameter, runs through lug, by which bowl is suspended; 2, 3, top and side views of right lug of same bowl; lug, 1¾ inches wide and 1⅝ inches thick, carved in conventional phallic symbol 2 inches long. *e*, small food bowl (*kumete*) of *puafou* wood (Cb139): greatest diameter 14¾ inches, least diameter 13 inches; thickness of sides at rim ranges from ¾ inch to 1 inch; depth of bowl 4⅝ inches; lugs plain, 2 inches long and 1 inch in diameter; bottom flat.

[831]

Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

sites. The only sites worth excavating on the atoll were old graves, but the fear of ghosts is so intense that none would allow such excavation for fear of punishment—possible death—by outraged spirits of the dead.

That such excavation, however, might be extremely fruitful is shown by an involuntary excavation that occurred during our stay on the atoll. Yepina, assisted by relatives and friends, was digging the grave for his grandson in a Ngake cemetery. A near-by grave which contained the skeletons of two young girls buried before white contact was unintentionally struck. Talainga, who was assisting, asked one of the men present to go to Yato to call me to see the objects contained in the grave. But Yepina, being in a hurry and feeling that he had committed an act of desecration in so clumsily opening the grave, refused to allow the messenger to leave the place. All the men present concurred, saying they had no wish to be plagued to death by the spirits of the two girls. Before Yepina covered the grave, Talainga was able to make rough sketches of a few of the objects in it and to note down others that he saw.

Among the objects close to the skeletons were one large basaltic adz; several *Tridacna*-shell adzes; many fishhooks including three pearl-shell hooks, two with barbs, the other a plain hook of the *tope* type; several shanks from composite pearl-shell bonito hooks, one with two projections on either side of the distal end of the shank; several pearl-shell points, evidently original parts of the same hooks; many pieces of pearl shell of different shapes which were probably at one time strung together to make the pearl-shell ornament called *mua titi ui*.

Talainga suggested when he told me of the incident that there were many more objects in the grave than he could note, so determined was Yepina to repair his error. General opinion was that the two girls must have been favorite children of a sorrowful father, who buried a wealth of objects with the two corpses to show the depth of his sorrows.

WORKING IN WOOD

Implements used by the Pukapukan craftsman for working in wood include the *Tridacna*-shell adz, the drill, a shell awl, a whale tooth or coral rock mallet, shark or ray skin and coral scrapers.

ADZES

Adzes (*toki*) were made of *Tridacna* shell (*ngalipoyua*), as shown by Macgregor (20,fig.13).[1] They were attached directly to the haft (fig.21). No rotary or movable adz was known.

Basaltic material from which adzes might be made was not available on the atoll. Legends of early canoe voyages relate that returning Pukapukan navigators brought back to the atoll stone from which adzes were made. At any time, the number of these on Pukapuka must have been small, and they gained in value both from their more durable quality as working implements

[1] [See 2: McGregor, p. 96—analyst.]

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

321
322
TT3

A craftsman took great care of his drill. He rubbed the shaft, crossbar and balance smooth with coral, smoked the wood over the cooking fire and oiled it afterward with coconut oil. The fortunate possessor of a drill with an iron guard point guarded his implement jealously because as a time saver it was of the greatest value to him.

Awl

322

The shell awl (*yuki vaka*), a shell *Terebra crenulata*, was used for making holes in a canoe hull or washstrake where the drill could not be used, or for enlarging holes made by the drill. (See p. 173.) The use of coral mallets for hammering caulking wedges is also described in that context.

413
284

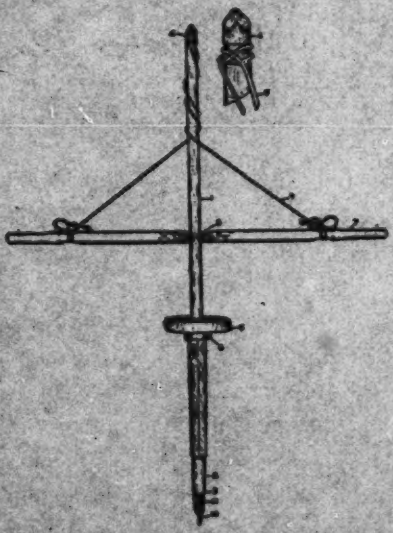


Figure 22.—Pump drill, *tava* (C8124): 1, shaft (*laku tu*) of *uvitau* wood 2 feet 6 inches long, round in cross section and ¾ inch in diameter above balance, square-sided below with sides ¾ inch wide; 2, distal end of shaft is round, ½ inch in diameter, narrowing to distal point (3) ⅜ inch in diameter; 4, head (*ulu tava*) of shaft blunt and notched to receive pump cord (*aha tava*); 5, balance (*petaka*), 4 inches in diameter and ¾ inch thick, cut from same block of wood as shaft; 6, secondary balance 1¾ inches square, ½ inch thick; 7, crossbar (*laku tava*) of *tuhaneva* wood, 1 foot 9 inches long, has wide groove (8) to fit against shaft; each end also grooved to receive ends of pump cord; 9, pump cord of two-ply twisted sennit, fastened with clove hitch to head of shaft and to each end of crossbar; 10, point (*mata*) section of iron forced into end of shaft and lashed tight with 11 transverse turns of three-ply sennit braid; 12, buried commencement and finishing ends.

Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

Scrapers and Rasps

412 322 177

Scrapers for smoothing wood were formerly selected pieces of coral (*punga*) with rough surfaces (*talatala*). The smoothing (*oloolo*) was done with the wooden object submerged in sea water in order to soften the wood. The first scraping was with the *punga* coral, the finishing scraping with a piece of *hoas* coral which has a surface covered with tiny, sharp "teeth".

The use of wood scrapers to which shark or ray skin is lashed is modern in Pukapuka. Informants stated that although shark skin was used formerly for fashioning pearl-shell hooks, the idea of using it for smoothing wood was introduced from Samoa.

WORKING OF SHELL

227 321

Mother-of-pearl shell is termed *si*. Other bivalve shells of about the same size and shape as pearl shell are also termed *si* with an added adjective, as in *si pukoyau alango*, to distinguish them from true pearl shell. Pearl shell is procured by grasping the shell with the hand and twisting it to break the tentacles. Thick shells were used for composite pearl-shell hooks, thin shell for ornaments and for single-piece shell hooks.

321 412

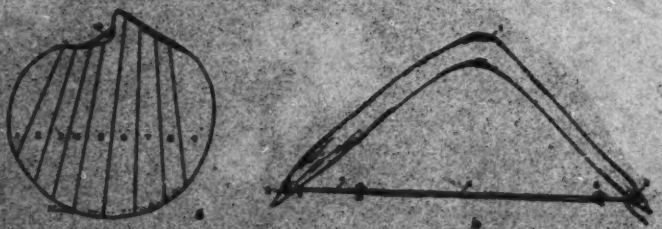


Figure 23.—Division of pearl shell; shell file. *a*, shell regionally divided into nine sections by cutting radially from hinge (10) to lip (11); preferred shanks for composite hooks cut from sections 4 to 7, other shanks from sections 1 to 3, 8 and 9; shanks for small composite hooks, single-piece hooks, and shell points for composite hooks cut from lip half of shell; named sections: 1, *tamo*; 2, *patamo*; 3, *pe hi te mua*; 4, *ayolelolo*; 5, 6, 7, *ayolelo*; 8, *iyomoto*; 9, *ahuwa*. *b*, shell file (*hoamoa*) of shark skin (Clozy): 1, frame, small branch of *waiwawa* wood with limbs 11 and 9 inches long; 2, 3, ends of limbs pointed and notched; 4, curled shark skin, 9½ inches long, ¾ inch diameter; 5, 6, suspension cords of two-ply twisted sennit, knotted to ends of shark skin, passed transversely around ends of limbs three times and knotted.

321 227

The whole pearl shell (*ika si*) is regionally divided by the Pukapukans into nine named parts (fig. 23, *a*). Radial sections cut through the hinge of the shell along these regional divisions are used for the shanks of bonito trolling hooks; the lip ends of these radial sections are used for small composite hooks and for bonito points.

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

321 The shell is cut along the section lines with the turtle-shell cutting implement (*taku*) or with a similarly shaped implement made from *punga* coral (*taku punga*). The edge of the blade is rubbed back and forward along the division line judged with the eye. A scratch is soon made on the nacreous surface of the shell. By further rubbing along this scratched line and by the addition at frequent intervals of water and sand, if the cutting implement is turtle bone, a narrow groove is formed which is finally deepened until the shell is cut through. A cut section of shell is shaped by rubbing and grinding with coral stone and water. Later the shape of a hook is filed out by the use of the shark skin rasp (*kauau*).

To smooth the outer convex surface of pearl shell, the shell is rubbed on a large piece of *punga* coral placed on the ground in front of the worker. Water is used copiously on the rubbing surface. At intervals the shell is dipped into a bowl of clear water or the surface of the shell is rubbed with the fibrous end of a ripe pandanus key to test the sheen and the stage of polishing reached. When the worker is satisfied that he has procured the desired color, he gives the surface of the shell a final polish by rubbing it vigorously with a dry pandanus leaf.

Lashing or suspension holes are made in shell pieces by the use of the pump drill.

Informants could suggest no ceremonial used in the manufacture of pearl-shell ornaments or composite hooks.

321 The shark-skin rasp is prepared as follows:

412 The skin of a freshly killed fish is submerged in fresh water for about eight days.
281 The skin is pegged out in the sun with wooden pegs until thoroughly dry. It is cut into pieces of suitable length and attached to a forked branch. A piece of skin that is flat longitudinally and transversely is attached to a branch to make the *kauau olo* used for smoothing and polishing fishhook shanks. For the *kauau ngaoa* which is used to cut out the curves of composite hook points and the bend of a single-piece hook, a piece of shark skin is scraped on the fleshy surface to remove the stiff membranes. This allows the skin to curl transversely and produces a file, round in cross section (fig. 23,*b*).

Shark skin is used for all purposes where a coarse abrasive is needed. The tail of the black ray (*uwi kaw*), also used as a file in the manufacture of pearl shell, is preferred by some because it lasts longer than shark skin.

CANOE CONSTRUCTION

501 Two types of canoe are used in Pukapuka today. One, the simple, one-
322 piece, dugout canoe, is used for fishing inside or outside the reef. The
511 other, a plank canoe with washstrakes and bow and stern covers, is used for fishing and for making expeditions to the islets of Ko and Kotawa. Canoe making is a craft still very much alive in Pukapuka and most households possess two or more canoes, one a dugout, the others larger plank canoes.

171 The single-piece dugout (*poti pukaua*) does not seem to be an old style
501 canoe. The only name for it is *poti*, a word probably derived from the
322 English word boat; if this derivation is correct, it is evidence in support of informants' contention that the canoe style is new. Informants suggested that formerly there were not sufficient big trees on the atoll to enable craftsmen to make single-piece canoes. The *poti* in use today is a simple hull balanced by outrigger and two cross booms.

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

501 Canoes built on old style models are the small plank canoe (*tatai*) with washstrakes, bow and stern covers; the large plank canoe (*vaka tui tuta*; pl. 5,*A*) with through and through lashing of the hull and washstrake sections; another large plank canoe (*vaka tui autali*; pl. 5,*B*) with inside flange lashing of the hull sections; the large double canoe (*taulua*) in which two canoe hulls are lashed together by cross booms. The number of outrigger booms in all types of canoes ranges from two to six, two being common. Multiple booms are used for some large canoes.

[925] There is no origin legend for any of these types of canoe save the bare statement that the first canoes were modeled on the shapes of the whale and a species of shark. A fragment is told, however, which indicates an early consciousness in Pukapuka of the superior workmanship of Samoan canoe builders. Two Samoan craftsmen, Kaviki and Vailaki, came to Pukapuka during a voyage of exploration. During their stay in Pukapuka, they engaged in a competition to see who could build the better canoe after the Pukapukan models. Kaviki made a *tui tuta* canoe, Vailaki a *tui autali* canoe. In both, the hull sections were so closely joined that none could see the seams on the outside of the hull. There is no tradition that the two Samoans affected in any way Pukapukan canoe-building technique.

322 Preferred woods for canoe building are: *tuakanava* and *uetau* for hull sections; *puapua* for washstrakes and outrigger cross booms; *pukama* for the outrigger float; *ngongie* for outrigger connecting pegs, diagonal braces, and lifting bars. Most single-piece dugout canoes are built of *pukama* (hence its name, *poti pukama*), with outrigger float of the same wood and connecting pegs of *ngongie* wood.

322 501 FIGURE 24.—Medium-sized Pukapukan canoe in Bernice P. Bishop Museum: outrigger detached for storage; lashing together of canoe hull by through-and-through method; metal plates have been added to outside of hull joins to protect sennit lashings from being severed by sharp coral. (Reproduced from Macgregor, 20; fig. 8.)

FIGURE 25.—Six-boom canoe. *a*, view of starboard side: 1, bow section of hull; 2, middle sections; 3, stern section; 4, washstrake; 5, fore section of bow cover; 6, after section of bow cover; 7, forward wave guard; 8, stern cover; 9, after wave guard and bait deck; 10, stern cover decorative cleat; 11, bar rest for trolling pole, used also as seat; 12, spar below which lifting poles are inserted to carry canoe; 13, stern outrigger boom; 14, bow outrigger boom; 15, secondary outrigger boom made necessary by heavy weight of large outrigger; 16, middle outrigger boom. *b*, top view: 1, bow cover sections; 2, stern cover; 3, gunwale; 4, wider upper edge of hull; 5, outrigger boom, extending in this large canoe well beyond starboard side; 6, outrigger float; 7, secondary boom running to (8) longitudinal spar; 9, seat with hole for supporting mast, a modern method of support found on only a few canoes; 10, connecting pegs between boom and float; 11, diagonal brace between boom (5) and outrigger connecting pegs (10). Canoe lashed by through-and-through method, used mainly for transporting supplies between Yato, the village of its owner, and Motu Kotawa. (Reproduced from Macgregor, 20, fig. 9.)

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

501
222

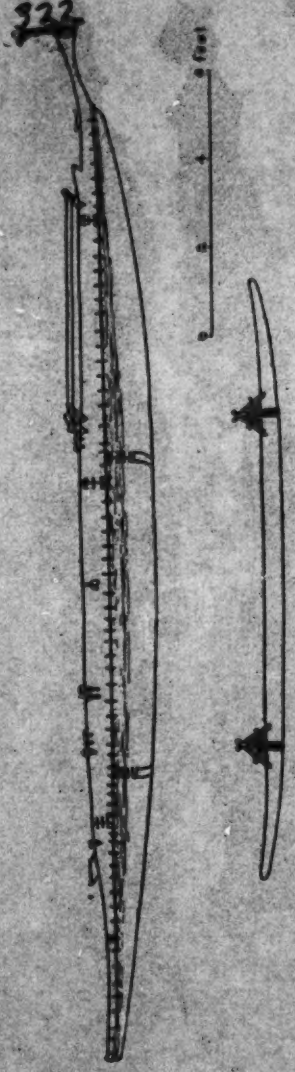


FIGURE 24.

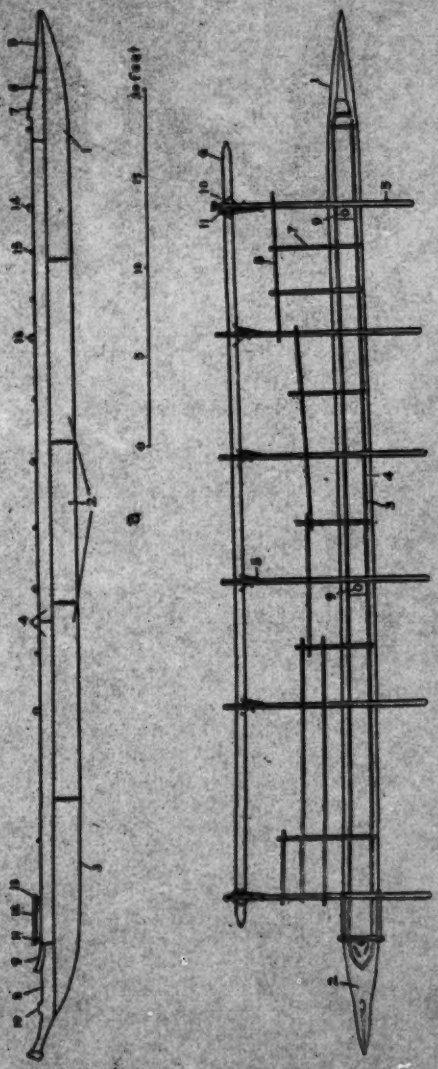


FIGURE 25.

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

501
192

The Pukapukan *tui tuta* canoe is shown in figures 24, 25, 26 and plate 5,*A*. The native names for parts of the plank canoe are given in the following list:

Mua vaka: fore section of hull.
Wualoto: central section of hull.
Muli vaka: aft section of hull.
Oa: washstrakes.
Velo: stern cover, shaped like fishtail.
Lauiau velo: after projection of stern cover.
Talamoko: raised cleat on stern cover.
Wakakauvae womu: raised bait deck on stern cover, fashioned from cover or built up with extra wood.
Tuku: place inside wakakauvae womu where bait and line are laid.
Kalemu: extreme after point of after section of hull.
Tala tuki: point of bow.
Tuki: forward part of bow cover.
Puka: second section of bow cover.
Tala puka: wave guard on bow cover.
Malae puka: top of wave guard.
Pu oyo: place covered by bow coyer where provisions and fishing gear are stored.
Kaukau: outrigger cross booms.
Kaukau mua vaka: forward outrigger boom.
Kaukau muli vaka: aft outrigger boom.
Kiato: longitudinal spar supporting cross booms.
Mana poto: additional short cross booms, supporting kiato and running from strakes to spar.
Aunu: outrigger float.
Mata aunu: bow and stern points of outrigger float.
Tutuki: connecting pegs between outrigger float and cross booms.
Tutuki tokai: diagonal bracing strut running from inner pair of pegs to boom.
Oanga: suspensory lashing supporting outrigger float.
Manu ki mua: forward lifting bar.
Manu ki muli: stern lifting bar.
Manu a lua: crossbar aft of after cross boom.
Palepale langayu: short longitudinal spars lashed on either side of washstrake to lifting bar and cross boom.
Lakau iki: lifting pole.
Twinga iki: sennit lifting loops fastened to starboard washstrake just aft of cross booms.
Yeice: seats formed by cross booms and lifting bars.
Tau muli: rear seat just forward of rear lifting bar.
Kaukau katea: starboard side.
Kaukau aua: port side.

322
501
284

The hull is in three sections lashed together (*tuia*) with three-ply braid which passes through holes (*pu*) bored (*puki*) through the hull with the shell implement termed *puki tuka*. A shell borer might be lashed to a wooden holder about 6 inches long, to make the implement called *waae*. The point of the shell was held against the wood with the left hand and the wooden holder tapped smartly (*paopao* or *tukituki*) with a mallet of *haupapa* coral or a whale's tooth (*tukituki paopao tuka*). The point was then worked gently from side to side (*luelue* or *wakiwaki*) to enlarge the hole. Tapping and working from side to side continued until a hole was made through the wood. The *waae* was then twisted (*puki*) and worked back and forth until the hole was of the required size. The lashing forms a criss-cross pattern (*lu hawa lua*, fig. 27,*A*). Washstrakes (*oa*) are added to the hull sections with a single diagonal lashing (*lu hawa tai*, fig. 27,*B*). Where the *oa* are in several sections, the edges of contiguous

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

922
501
284

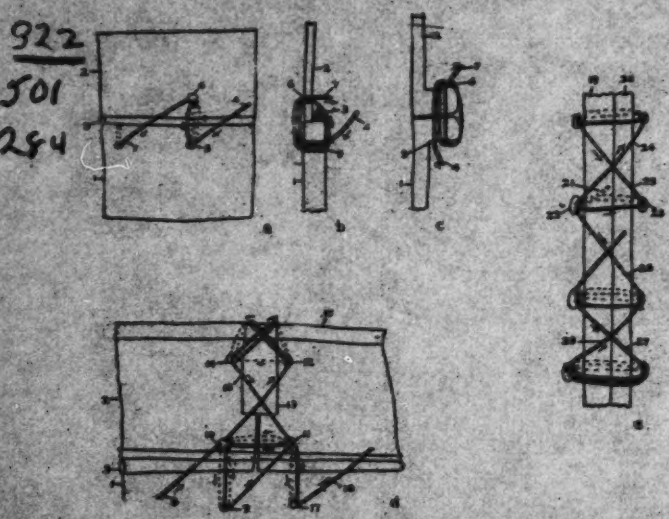


FIGURE 69.—Lashing of washstrake to hull: *a-c*, single diagonal lashing (*la kaua tai*); *d*, double diagonal lashing (*la kaua lua*); *e*, inside flange lashing. *a*, view of single diagonal lashing from hull interior: 1, hull section; 2, washstrake; 3, caulking stick (*tuke*) placed against caulking husk material; 4, commencement end of sennit passes from preceding hole down to inferior hole (5), through to hull exterior, and up to superior hole (6), then back through 6 to hull interior, down to inferior hole; makes one more turn and when brought back through superior hole a second time, passes down to inferior hole (7) ready for next turns. *b*, cross section of same lashing on *tai iuta* canoe (through-and-through lashing): sennit (4) makes two transverse turns through inferior and superior holes (5, 6), securely binding washstrake (2), hull (1), and caulking material (3); 7, free end ready to pass to next inferior hole. *c*, cross section of same lashing on inside flange canoe (*tai au tahi*): lashing (4) makes two transverse turns through holes (5) in hull and (6) in washstrake, and free end (7) passes to next pair of holes. *d*, lashing of contiguous sections of washstrakes by double diagonal lashing: commencement end of sennit (8) makes two transverse turns through holes 10 and 9 of washstrake and hull; free end passes to inferior hole (11) in contiguous washstrake section; one transverse turn made between holes 11 and 10, and on second turn sennit passes on outside of canoe, through to inside at hole 10 and diagonally up to superior right hole (12), securely gripping gandanus material (13) which is laid over join of washstrake sections as caulking; sennit passes through hole 12 and along on outside of washstrake to hole 14, back through 14 and diagonally up and over edge of washstrake (15); sennit continues down on outside of washstrake to hole 12, through to inside and diagonally up, over washstrake edge, down to and through hole 14; two more diagonal cross turns made over washstrake edge and free end of sennit brought back and through hole 14 to inside of washstrake; sennit (16) continues diagonally down and across to hole 11, passes through 11 and makes two transverse turns around hull and washstrake between holes 11 and 17; free end (18) passes up to next pair of holes

1:Banglehole and Banglehole K-5 (1934-5)1938 Pukapukans

322
501
284

sections are locked by the *ia kaava* hoo locking (fig. 27*d*). Caulking material of dried coconut husk (*puku pue*) is hammered into the joint of hull sections with a cone-shaped wooden caulker (*aaveaveve*). The lower edge of the washstrake is set on the upper edge of the hull, flush with its outer surface. Sennit (*kaava ungo niti*) or coconut husk fiber is laid on the lower edge of the hull; on top of this caulking material is laid a filler stick (*tuke*). The lashing of strake to hull holds the caulking securely in place (fig. 27*d*). The holes through which the lashing passes are caulked with coconut husk or wooden plugs hammered in from the outside with a rectangular-shaped wooden caulker (*niti*). These plugs keep the lashing tight and prevent leakage and rotting of the lashing. The raised bait deck, which is fashioned from the stern cover or else built up with outer ward is shown in figure 28*a*. The stern cover is locked to the hull by through and through lashings (*ia kaava tai*) and caulked on the outside by filler sticks (*tukipuki*). The two-piece bow cover is locked to the forward section of the hull by through and through lashings.

The outrigger is attached to the canoe by cross booms locked to washstrakes with the common alternating curved locking which passes over the booms and through holes bored in the strakes. The longitudinal spar is also locked to cross booms with the alternating curved locking. The outrigger is fastened to cross booms by connecting pegs (*tutuki*). Bow and stern cross booms are connected by four pegs; additional cross booms by two pegs. The points of the pegs are driven into the outrigger, but not locked to it. The locking of pegs to cross booms is shown in figures 28*e,f*, and 28*h*. A diagonal bracing strut (*tutuki tuloa*) runs from the inner pair of pegs to the boom. The attachment of this strut to pegs and boom is shown in figure 28*g*. A supporting locking (*avega*) supports the outrigger and prevents it from separating from the pegs when the canoe is lifted. This locking is shown in figure 29. The forward cross boom is shorter than the after cross boom. This enables the outrigger float to be fixed so that the fore end of the float is nearer the canoe hull than the after end (see measurements, p. 184), an arrangement which makes the canoe easier to steer.

The fore lifting bar is locked across the washstrake forward of the forward cross boom. A stern lifting attachment is made by fastening a lifting bar across the strakes just forward of the rear bait deck. Short longitudinal spars are locked on either side of the washstrake to the second cross bar and cross boom (fig. 30*a*). To lift the canoe, lifting poles are thrust between these spars and the washstrake from the starboard side and the canoe is lifted by upward pressure on the lifting pole. In large canoes, a lifting pole is also thrust through the lifting loop (fig. 30*b*) and when the weight is taken, the distal end of the lifting pole rests on the port side of the washstrake. All Pukapukan canoes have an extension fore and aft of the *kaava* spar beyond the fore and aft cross booms, which is a certain nuisance in paddling on the port side of the canoe because the paddle, in being raised from the water, often strikes against this extension. However, to take a canoe through shallow water over the reef, the crew wades and drags or

---

to continue single diagonal lashing of washstrake to hull as shown in *a*. *e*, inside flange lashing of hull sections in the hull canoe: 19 and 20 represent contiguous raised flanges of contiguous hull sections; 21, buried commencement end of sennit on outside of hull; sennit makes one transverse turn through holes 22 and 23, then passes diagonally up (24) to superior pair of holes; makes transverse turns through holes and passes diagonally down (25) to hole 23, makes one turn through holes 23 and 22, again binding commencement end (21); sennit passes diagonally down (26) to mint pair of flange holes in hull, makes one turn through holes, passes (27) to next pair; two transverse turns made through lowest pair of holes and sennit brought back to pass diagonally upward (28) to next pair of holes, makes turn through holes, passes diagonally up to next pair; free end passes into hole 29, where it fastens by hammering of caulking wood into flange hole on top of free end.

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

322
501
284

pushes the canoe, using the washstrake and spar extension as shafts. The man in front stands between the side of the canoe and the spar extension, grasping the washstrake with his right hand and the *kato* extension with his left. Similarly the man in the rear stands and pushes the canoe before him.

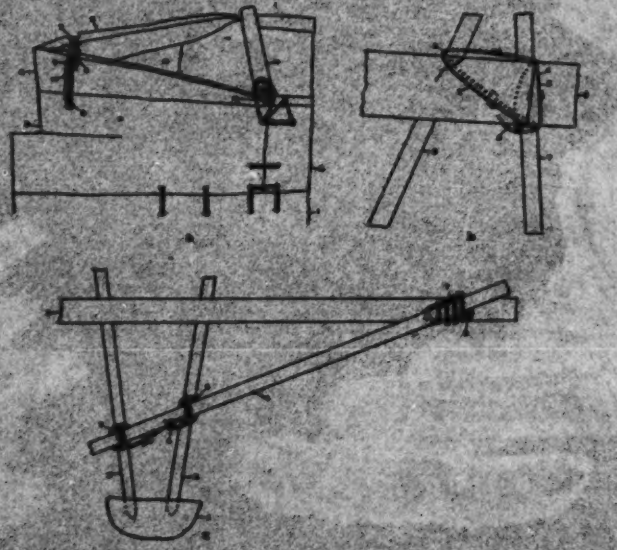


Figure 58.—Canoe construction. *a*, two-piece stern hull deck: 1, stern hull section; 2, washstrake; 3, section of stern cover (*vale*); 4, 5, fitted sections of wood placed on top of forward end of stern cover and lashed to cover by sennit which passes over notches 6 and 7 cut on edge of extra sections, and through hole 8, bored through head of stern cover; lashing consists of buried commencement (9), several transverse turns over notches and through hole, and buried finishing end (10); forward ends of added sections continued under first crossbar (11) lashed to washstrake on either side; lashing (12) securely binds in place added sections to washstrake; 13, platform of hull deck formed by top of stern cover. *b*, commencement lashing of connecting pegs to outrigger boom; diagram shows inner pair of pegs (7, 8) and outrigger boom (9); 1, buried lashing commencement; sennit passes around far side of inner peg (8), then diagonally down (2) and across boom to near side of outer peg; continues around far side of peg, then diagonally up and across far side of boom and around far side (3) of inner peg; continues across far side of boom, around far side of outer peg and down (4) near side of outer peg, passing over earlier turn; continues underneath and up far side of boom, down (5) again on near side of boom, underneath outer boom, then ready to pass diagonally up on far side of boom across to top of inner peg (8); lashing continues with 6 figure-of-eight turns around connecting pegs and boom, then two circumferential turns around connecting pegs superior to boom; sennit connecting pegs brought close together above boom so that third sennit must be forced between pegs for two circumferential turns, and closeness of pegs holds turns tight; free end of sennit passes along boom to outer peg

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

322
501
284

of connecting pegs and repeats lashing; free end passes down outer connecting peg to commence suspensory lashing around float shown in figure 29, *c*, lashing of diagonal brace (*tuaki tahai*) to connecting pegs and cross boom of outrigger: 1, cross section of outrigger float into which connecting pegs (2) are driven; 3, outrigger boom; 4, diagonal brace lashed to connecting pegs by alternating curves pattern lashing (5); lashing has buried commencement on outer peg; after completing lashing of outer peg, free end of sennit continues to inner peg, completes similar lashing; free end (6) fastened by double overhand knot to sennit that came from outer peg; lashing of diagonal brace to outrigger boom has buried commencement (7); free end of cord makes three or more transverse turns around brace and boom, then one or more circumferential turns around lashing turns between brace and boom and finishes with overhand knot on last circumferential turn (8).

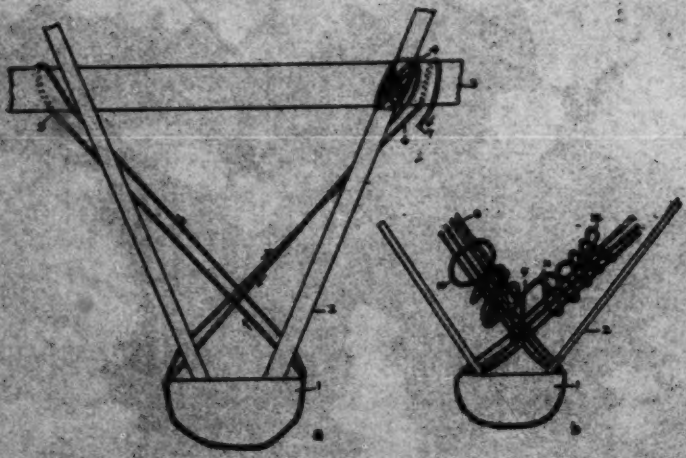


FIGURE 29.—Suspensory canoe lashing. *a*, commencement of lashing between outrigger boom and outrigger float: 1, outrigger float in cross section; 2, connecting peg between float and cross boom (3); when lashing (4) of outer connecting peg to cross boom is finished free end of sennit brought down between double pair of pegs (only outer pair shown in diagram) to inner side of float, passes around under float, up on outside of float and across to boom at 5, on hull side of inner peg; turn made over boom, and sennit brought down to outer side of float, around float, and up on inner side (6) to boom, making turn around boom on outer side of outer peg; sennit (7) continues down to float as before, making altogether five turns around boom and float (two turns only shown in diagram). *b*, continuation of suspensory lashing: after fifth turn (fourth in diagram), free end of sennit (8) brought down from hull side of inner connecting peg to pass around and under crossing of suspensory lashing (9) and continues up left hand suspension with two transverse turns; a complete final turn made around suspension, and sennit (10) brought back down suspension with two more transverse turns, continuing across to right hand suspension (11); five transverse turns made around right hand suspension with buried end finish (12).

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

322
501
284

Flaws in the wood from which hull or strakes are made are cut out and in their place small sections of wood (*tapihi*) or larger sections (*vaka'akaukau*) are fitted in by hammering and lashed if necessary to the surrounding hull or washstrake wood. Where the washstrake wood is not sufficiently deep, additional sections (*vaka'apihi tai*) are lashed with through and through lashing to the washstrake base until the required depth is attained. Small cylindrical plugs of wood (*tapihi* or *mose*) are hammered into small knot or flaw holes in the outrigger float to keep the salt water from lodging in them and rotting the wood.

When surfaces are being fitted together, whether hull sections, or washstrakes to hull, or small patch sections to hull or strakes, the parts to be joined are smeared with a marking material of coconut-shell charcoal mixed with water and applied with a brush made of the charred fibrous material of the pandanus key. Irregularities in the fitting of the parts are brought out by black marks. These irregularities are then adzed down until a perfect fit (*ave* or *temoemoe*) is secured.

In canoes used in bonito trolling, the rear seat is made of a block of wood which is lashed on either side with through and through lashings to each washstrake. A flange is cut on the under aft side of this seat and a semit grommet (*matatihi*) is lashed to the seat in the middle of this flange. The bait holder (*tahua*) of the bonito pole (*matila ate*) rests in this grommet and the pole rests in a groove cut in the after fishing seat.

[501] The size of a canoe is indicated by the number of seats (*yuka*) it contains. But a vaka *yuka ua* (four-seater canoe) holds only three men comfortably; a vaka *yuka lima* (five-seater canoe) holds four men comfortably or five men if the hull is especially wide; a vaka *yuka ono* (six-seater canoe) holds six men. From this number of seats upward, the number of crew becomes greater than the formal seating capacity, so that a 60-foot canoe, officially rated as a vaka *yuka tinagavulu ma tolu* (thirteen seater), easily holds 30 or more men. Those that cannot be accommodated with formal seats rest on the edges of the strakes. The size in feet of the various canoes is given below (p. 185).

The hull of the *tatai* plank canoe is of one piece in very small one-man canoes or of three pieces in larger canoes. The hull sections are as before, *waa vaka*, *waalotu*, *waali vaka*. Washstrakes are added and a simple bow cover (*pupuni hi waa*) and a stern cover (*pupuni hi waali*). These covers are shaped pieces of wood lashed to hull and to washstrakes. (fig.30,*c*). Very rarely, a small canoe of this type is fitted with the shaped stern piece (*vaka*) and the type bow covers (*tuki* and *puke*). Outrigger support consists of two cross booms, connecting pegs, and suspensory lashing. The *tatai* canoe differs from the simple one-piece dugout in the addition to the hull of washstrakes and stern and bow covers. The size of typical *tatai* canoes is given below.

The plank canoe named *vaka tai waali* (pl.5,*B*) is distinguished from the through and through lashed canoe (*vaka tai tuta*) by the lashing of hull sections to each other, and of washstrakes to hull, and washstrake sections to each other by means of raised inside flanges (*kaupa vaka'ehe* or *kaupa tai waali*). These flanges are about 2 inches high and the lashing is through

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

322 holes drilled through each flange (fig. 27, *e*, *g*). No lashing shows on the outside of the hull. This lashing method may be applied to plank canoes 501 of all sizes from the simple *tatai* canoe to the largest canoe.

284

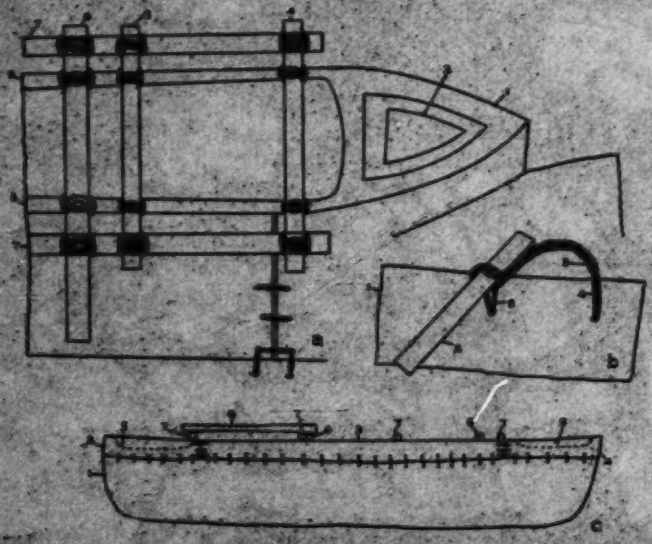


FIGURE 27.—Plank canoe. *a*, arrangement of lifting bars at stern of canoe: 1, raised bait deck (*mahakatea* stage); 2, bait receptacle (*tahu pakupaku*); 3, washstrake of canoe; 4, cross lifting bar (*manu hi mui*); 5, second cross bar (*manu a lua*); 6, cross boom supporting outrigger float; 7, longitudinal members (*palepale langaya*) lashed to cross members; lashings all of alternating curves pattern. *b*, lifting loops of sennit (*huinga ihi*): 1, section of washstrake; 2, cross boom; 3, lashing of boom to strake; 4, four turns of sennit made through hole in strake and around lashing of boom to strake; 5, seizing of these four turns, buried commencement and finish. *c*, *tatai* canoe: 1, one-piece hull; 2, stern cover (*pupuni hi mui*); 3, washstrake; 4, bow cover (*pupuni hi mua*); 5, dotted lines show lowered bait decks in covers; 6, cross booms to outrigger float; 7, short lifting bars; 8, short longitudinal spars (*palepale langaya*) forming lifting supports for stern of canoe.

501 The *tai aloali* canoe has definite advantages for reef work over the through and through lashed canoe because of the absence on the outside of [226] the hull of lashings to be cut by sharp coral heads. It has this disadvantage, 322 however, that the water seeps in through the hull joins and rots the wood about the joins of the hull sections. This seepage cannot be prevented by caulking as with the *vaka tai tuto* lashing. If a canoe is used much, the wood

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

501 about the hull joins is seldom dry, and after about 10 years the wood be-
322 comes so rotten that the flanges break apart. The only remedy is to take
the canoe apart, adz off the rotten sections of wood, and rejoin the canoe
as a *vaka tui tuta*. The sennit lashing of the *vaka tui tuta* lasts about seven
[283] years before it rots. It is easily replaced if care has been taken of the
canoe and the wood round the joins has not become rotten through un-
suspected water seepage.

501 The customary Pukapukan canoe for deep-sea fishing or voyaging was
[226] the single outrigger canoe. At various times, however, the double canoe
(*tauhua*) was made and used, particularly for regular fishing trips to Tima
179 Reef. A time is remembered when three double canoes were in commission
on the atoll. Tradition seems to indicate that the art of making double
canoes was introduced by returning Pukapukan navigators. The chief Wue
(who lived about 14 generations ago) is reputed by some to have been the
first man to build a double canoe in Pukapuka; he modeled it after one he
had seen in his travels abroad. Lack of sufficiently large timber is given as
the reason why few double canoes were built. No informant had seen a
Pukapukan double canoe. The following brief description is based on tra-
ditional information only:

The larger of the two canoes was to leeward and carried the two masts. The smaller canoe acted as an outrigger and was to windward. Cross booms (*hauhua*) joining the two canoes were probably logs of pandanus, three booms being necessary to provide a stable support. Both canoes were completely decked with logs of *puapua* wood; save for holes or hatchways that served as bailing cockpits and gave entrance to stores and fishing gear loaded inside the hull of the windward canoe. Diagonal cross braces from the stern and bow of each canoe to the fore and aft cross booms were termed *tolui*. A platform (*papanga tauhua*) laid across the booms was occupied by the crew and passengers who also used the leeward canoe for shelter. On one part of the platform was placed a small house which functioned as a god house (*uale atua*). No details are preserved of lashings or sizes of these double canoes. But it is likely that the reason the single outrigger was the preferred canoe is that it could be made more seaworthy because the outrigger could be more strongly lashed to the hull than
502 on the big and unwieldy double canoe. The double canoe was steered by two or three steering paddles, one man steering from one canoe and the second man from the platform between the canoes. Should a sudden turn be desired, the two steersmen were reenforced by a third who assisted from the stern of the second canoe.

To change the direction of any canoe is *uuli* or *uuuuli*. The change of direction is to starboard (*hi katea*) or to port (*hi oua*). The bowman calls out the direction of change thus: *La oua!* or *La katea!* When the required direction is defined, he calls out: *Tewi ai!* (Hold it now!)

501 Variations on the fundamental construction pattern of the Pukapukan
322 canoe are few:

In one single-piece dugout canoe, rather large for its type, greater stability was given to the two outrigger cross booms by projecting the ends of these booms about 18 inches beyond the starboard side of the hull and lashing to these ends a longitudinal

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

spar parallel to the customary longitudinal spar (*hiato*) lashed to the cross booms on the port side of the canoe. Informants also mentioned that formerly a big canoe made for fishing off the grounds by Tima Reef was fitted with two stern pieces (*tvio*). The *vio* was cut from a single wide block of wood and two fish-tail ends were adzed out instead of one. This variation was characterised as a type of decoration (*vaka-manea*) without utilitarian function.

One canoe in active use had attached to the hull only half of the customary two-piece bow cover. The fore part of the bow, usually covered by the *tuhi*, was open, but the after part of the cover, the *puka*, complete with wave guard (*malae puka*), was securely lashed to the hull. Informants remarked that this was an idiosyncrasy of the builder of the canoe. He had been faced by a shortage of wood during construction some years previously and had not since bothered to complete his canoe, but was on the contrary rather proud of its odd appearance.

Sails

Two types of sail, both said to be old, are in use today when canoes sail to the islets. The first is a triangular sail, *lo mata keokeo* (*keokeo*, pointed); the second, a gaff sail, *lo liahi a Te Palo*, named after the Yayake navigator who visited Pukapuka. Both types of sail were formerly made of pandanus (*lau vaka*) plaited in single element check (*langa tai*). The sail was made large enough to allow for an overlap which is basted over the sennit becket rope (*uuvuti hi loto o te la*) by which the sail is supported on the mast. (See figs. 31, 32.) The basting was done (*tui*) with pandanus material (*tua hia*) through holes made with a bone of the *akula* fish or a piece of *ngangie* wood. Sheets (*tupoupou*) of two-ply twisted sennit are fastened to the becket ropes by overhand knots.

Formerly the mast (*tila la*) was made in two parts: a crutch (*tuy, manga*) was lashed to the mast pole (fig. 31,*b*). The mast was raised by resting the crutch end on the forward cross boom (*kambou hi mua*). Several turns of sennit were made around the boom to prevent the crutch from slipping sideways. Stays (*tuku*) supporting the mast are shown in figure 31,*c*.

The sail is supported by the top of the mast in one of three ways: the guy (*uuvuti*) by which the sail is hauled aloft may be passed through a hole (*pu*) bored through the top of the mast; the guy may be passed over a natural branch cleft (*tua manga* or *kakeo*) at the top of the mast and passed down to the canoe; the becket (*pu*) in the peak of the sail may be passed over the top of the mast before the mast is raised—the mast is thick enough at this end to prevent the becket from slipping down. The last method is used only in small canoes. In all three methods when the sail is aloft the guy is fastened to the port side of the forward outrigger boom.

Today, the mast is usually long enough to rest against the bottom of the canoe. It is lashed to the forward cross boom with figure-of-eight turns of heavy sennit, or else the stay passing from masthead to forward lifting bar is continued back to the cross boom to make several turns around both mast and cross boom. Ultra-modern Pukapukan sailors step the mast in cup-shaped blocks cut out from the floor of the hull, or else lash to the washstrakes planks with holes in them through which the mast is stepped.

The sail is further supported by a horizontal boom (*tila lalo*) with a crutch at one end, resting against the bottom of the mast just above the lashing of mast to cross boom. The other end of the boom (*ulu tila lalo*) is fastened to the sail by a becket. A main sheet (*uuvuti*) of sennit is fastened by a clove hitch to the boom from which it runs to

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

501
322
284

the hand of the sailor. When the canoe is sailing before a steady wind, the main sheet is fastened to a cross boom or lifting bar, or else it is gripped underneath the foot of the sailor.

At the inner, lower end of the sail the bucket rope passes from the sail and is now termed sault ia. It is fastened to the forward cross boom, or else its two ends are tied into a loop which is slipped over the crotch of the boom. Either method keeps the inner, lower end of the sail from bellying loose in a high wind.

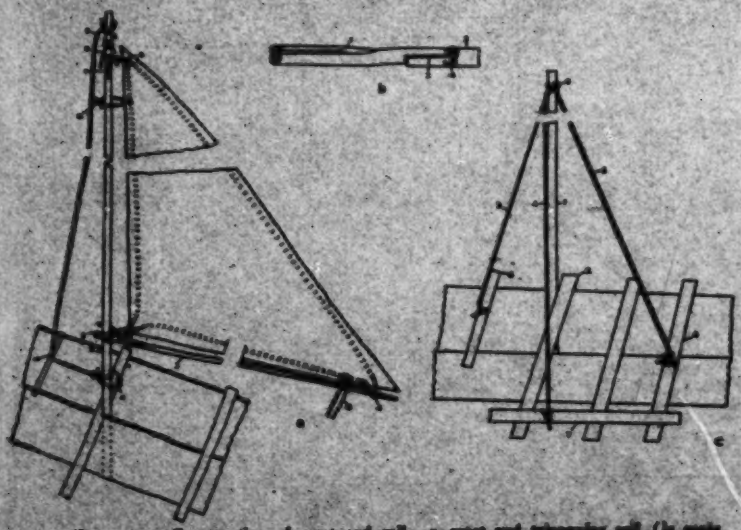
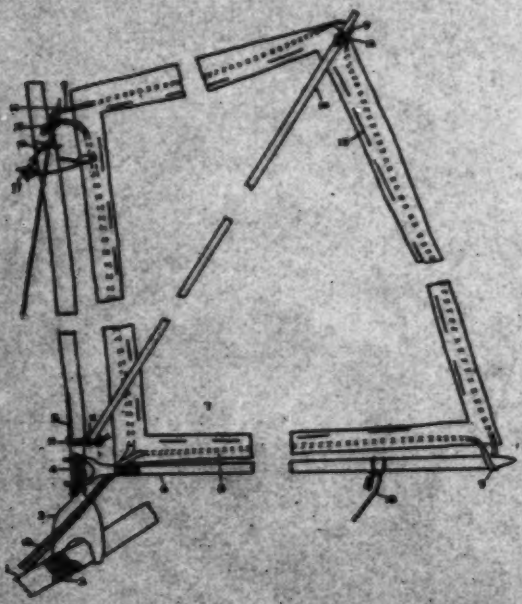


FIGURE 31.—Construction of mast and sail. *a*, mast and triangular sail (*la* mata kaihoe): 1, cross boom; 2, mast; 3, boom with crotch and resting against mast; 4, outer bucket, hooked over end of boom; 5, inner bucket sennit ends, fastened with overhand knot in loop which passes over end of crotch to keep sail taut; 6, peak bucket, fastened to guy by overhand knot; 7, guy passes through hole in mast and down to cross boom where it fastens; 8, mast stays passing to after booms as shown in *c* below; third mast stay (9) passes down to forward lifting bar, makes two turns (10) around bar and passes again to cross boom to make two turns (11) around boom and mast, holding mast in place against boom; overhand knot finishes turns; 12, sheet, fastened to bucket pennit and to mast by overhand knot; 13, main sheet, fastened to bucket sennit by overhand knot and passes to canoe aft. *b*, attachment of crotch (raw mauga) to mast spar: crotch (1) scarfed and fits against scarf (2) cut in mast spar (3); commencement of transverse lashing turns (4) which bind crotch and mast at scarf join. *c*, staying of canoe mast: 1, mast stands inside of canoe, lashed to cross boom (2) (lashing not figured); 3, 4, 5, stays fastened to top of mast by clove hitch (9); 3, forward stay fastened to forward cross lifting bar (6); 4, stay fastened to longitudinal spar (7) aft of cross boom; 5, stay fastened to middle cross boom (8) at washstrake; stays fastened to booms by clove hitches; weight of sail, filled by wind, provides counter-balance on starboard side of canoe to part side pull of stays.

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

502 In a heavy wind, the mast of a triangular sail is kept vertical. To catch the greatest amount of moderate or light wind, it is heeled over to an angle of about 30 degrees with the vertical. The boom runs from the mast at an angle of about 60 degrees, and the sail functions thus with its base upward and the apex down. This is the usual way of mounting the triangular sail.



501 322 284 FIGURE 32.—Mast and gaff sail (*Ia kaki a Te Palo*): 1, cross boom to outrigger, on which crotch (*sau manga*) (3) of mast (5) rests; 2, lashing on crossbar to prevent mast from slipping; 4, lashing binding crotch to mast spar (5); 6, boom with crotch resting against mast; 7, gaff sail; 8, becket sennit basted into overlap of sail; 9, becketts which pass over end of supporting spars and loop sail that; 10, sprit or gaff which extends outer peak of sail, resting at lower end in scotter (11) of sennit made by taking clove hitch around mast and tying free ends of sennit in overhand knot; at upper end of sprit, becket prevented from sliding down spar by lashing turns (12) taken around end of sprit; 13, heavy lines indicate sewing of overlap to hold becket sennit; 14, natural branch cleft (*sau manga*), over which becket loops when sail is hauled up by means of guy (15) fastened to becket by clove hitch; 16, stays run to booms to support mast (see fig. 31, *c*); 17, sheet fastened to becket sennit with overhand knot and looped around mast with double overhand knot; only one sheet shown, but average sail has about six sheets for mast and for boom; 18, main sheet, fastened to boom by clove hitch, runs to roller control aft in canoe; 19, two ends of becket sennit (*sennit ka*) pass to, and are fastened around, cross beam (1).

I:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

An extra sail support is needed with the gaff sail (fig. 32). This sprit is termed *toko*. At the lower end it rests in a snotter (*nakonakonga se te toko*) fastened to the mast. In a strong wind blowing directly aft, the gaff sail is supported by a further stay that runs from the head of the sprit to the stern cross lifting bar, occasionally to the curve of the stern piece around which it is fastened.

For a one-man canoe for sailing to the islets, a rough-and-ready sail is made from a coconut-leaf mat (*takapau*). A pole is stepped in the canoe and lashed to the forward cross boom. The midrib side of the mat is fastened to the pole with sheets of coconut fiber (*kaisuu*) and the outer edges of the mat stayed by guys passing to the hand of the sailor who sits in the stern of the canoe and steers. A *takapau* mat catches ample wind to speed along a small canoe.

The mast of any Pukapukan canoe is mounted at either end of the canoe, the outrigger being invariably kept to windward. The canoe can not tack without unshipping the mast and setting it up at the other end of the canoe. Sailing fast (*haiali* or *pole*) in a heavy wind, some members of the crew rest their weight on the outrigger cross booms in order to counterbalance any tendency of the outrigger to lift out of the water. Under sail a Pukapukan canoe lies close to the wind, but tends to make rapid leeway for want of a keel.

Paddle and Bailer

The Pukapukan paddle (*uwe*, fig. 26*d*) has a projecting knob (*muta*) at the distal end of the blade. This knob has a dual function. It protects the blade (*laulau uwe*) when the canoe is being poled over lagoon shallows, and, when the paddle is brought from the water with a sharp wrench after a short jab stroke, the knob makes, in contact with the water, a short, sharp, ringing sound (*hoo tangi te uwe*), used to attract fish to the fishing canoes. It is a very characteristic sound in Pukapukan paddling, and wherever it is necessary to imitate a canoe in May Day play festivals, a file of men walk about making this sound with their lips, at the same time raising and lowering their arms.

The paddle is used on both port and starboard sides of the canoe. The outrigger does not offer great impediment to the typical short, jabbing strokes of the Pukapukan paddler. Any paddle is used indifferently for steering and paddling. Formerly the paddle was always held with the back (*tua*) turned toward the rear of the canoe. This stroke (*alo tua*) is reserved today for short sprints and for making the paddle rumble, the front (*alualo* or *vakevake*) of the paddle being now customarily directed toward the rear.

Each canoe has as part of its equipment a long pole (*toko*) used for poling the canoe over reef shallows. Some canoes returning to Wale from Motu Ko beg the reef circuit and make good speed with two people poling, one in the bow and one in the stern.

The bailer (*tuto*, fig. 26*g*) is of common Polynesian type. It is not decorated with carving. In use, the bailer is not filled, lifted, and emptied over the side of the canoe, but water is gathered from the bottom of the hull and shot out with one vigorous and continuous scoop. In small canoes, an empty coconut shell serves as a bailer.

Measurements

The principal measurements of seven Pukapukan canoes are given in Table 3. These measurements may be compared with those of the 13-seater canoe shown in figure 25.

The amount by which the forward end of the outrigger float is set to starboard to assist the steering qualities of the canoe ranges in the canoes measured from 2 to 6 inches, with an average of about 3½ inches. Pukapukan canoe builders gave no rule

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

501 322 for judging this amount, but said that they judged by the eye. Kennedy discovered from a study of canoes of Vaitupu that the "limiting amount by which the forward end of the float is set to starboard is about one hand's breadth from a line through the after end of the float parallel with the hull" (19, p. 94); this amount agrees closely with the Pukapukan average for this starboard set, though there seems to be little correlation between the size of the canoe and the amount of starboard set considered necessary. The required balance weight of the float seems to be obtained almost entirely by lengthening the float, for the width and depth of the float do not vary greatly save for the larger canoes. The length of the float in relation to the overall length of the canoe indicates that the Pukapukan builders unconsciously judged the float length by some such rule as Kennedy (19, p. 79) gives for Vaitupu where the outrigger is given a length such that the forward end will be laterally opposite the feet of the bow paddler and the after end opposite the feet of the rearmost paddler. Again, Pukapukan builders could give no rule for judging the proper length of the outrigger float save an eye judgment.

Table 3. Canoe Measurements

501

Type	1 Overall Length	2 Hull (Gunwale)	3 Hull (Keel)	4 Davits (Canvas Cleat)	5 Length, Forward Outrigger Boom	6 Forward Outrigger Boom, Hull to Outrigger	7 Main Outrigger Boom, Hull to Outrigger	8 Length, Lashed Float	9 Length, Outrigger Float	10 Width, Depth, Outrigger Section	11 Length, Stone Piece (Tip to Gunwale Joint)	12 Length, Bow Piece (Tip to Gunwale Joint)
Single outrigger (large)	16'	14"	14"	16"	7' 3"	6' 3"	6' 7"	9' 10"	12'	5½"×4½"	—	—
Tuisi tokasi — one-man canoe	10' 6"	10"	8"	17"	2' 3"	4' 7"	4' 9"	6' 4"	7' 8"	5"×3"	—	—
Tuisi tokalua — two-man canoe	19'	11"	9"	16"	6' 6"	3' 7"	3' 10"	9'	13' 3"	6"×4"	4' 3"	3' 9"
Yolu tolu — 3-seater	16' 6"	11"	7"	15½"	5' 6"	4' 10"	5'	9' 6"	12'	5"×3½"	3' 6"	3' 7"
Yolu va — 4-seater	21' 11"	14"	11"	18"	6' 6"	4' 8"	5' 1"	10' 4"	16' 4"	5½"×4"	3' 11"	3' 4"
Yolu ono — 6-seater	31' 6"	15"	11"	20"	8' 1"	5' 10"	5' 10"	18'	22' 6"	7"×6"	5' 2"	6' 7"
Yolu iva — 8-seater	51'	22"	14"	27"	8' 8"	7' 8"	8' 3"	27' 6"	32' 8"	7"×7"	—	—

FISHING EQUIPMENT

127 Besides fishnets (p. 208) and hooks (p. 191), fishing equipment includes lines, fishing rods, composite fishing apparatus, clubs, fish spears, and hook containers.

FISHLINES

121 Lines of sinnet fiber are used on composite pearl-shell fishhooks where quality rather than length of line is important. Three-ply braided sennit

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

WOODEN HOOKS

227 Wooden hooks vary greatly in size according to the fish they are designed to catch. Small wooden hooks are used interchangeably with the single-piece pearl-shell hook (*tope*) for catching in deep water the smaller reef groupers. Large wooden hooks are used to catch *Ruvettus* and other large deep-sea fish. All wooden hooks are termed *hou*; the largest V-shaped hook is sometimes distinguished by the name *yemo*, the largest U-shaped hook by the name *yewe*.

Wooden hooks are of two shapes, the U-shape and the V-shape. All the hooks are made from *ngongie* wood; most of them from forked branches, [245] some of the U-shaped ones from branches that have been artificially bent and made to grow in this position. The hooks are two-piece, the point being fitted to the point limb with a lashed scarf join. The upper end of the shank is narrowed and provided with a shank knob to support the lashing of snood to shank.

227 In larger hooks used for *Ruvettus* and other deep-sea fish, the lashing of point to 284 point limb may be in two or three separate sections. This occurs in five of the eight deep-sea fishhooks available for study. The remaining three hooks are freshly lashed, probably by inexpert fishermen who knew that the hooks, intended for a museum collection, would never be used for fishing. The middle of three lashings is put on the smaller hooks about 1 inch below the head of the functional point, 2 or more inches below this point on larger hooks. After the transverse turns completing this lashing have been made, the lashing is covered by tough fish scales (*soumei*) of the *swiatos* fish which project above and below the lashing. The ends that project below are caught with the transverse turns of the lowest lashing, those that project above are caught with the turns of the topmost lashing. The fish-scale covering protects the middle lashing from being destroyed by the biting teeth of a hooked fish. Because it is usual to protect only this middle lashing, one may assume that a hooked *Ruvettus*, for example, is expected to swallow a hook to the point where his jaws close on this middle lashing, not on the lowest or topmost lashing. The free end of the lowest lashing is carried up over the fish scale covering to commence the topmost lashing; even if this longitudinal thread is severed, the topmost lashing can not become unravelled because the free end is effectively buried in the descending turns. (See lashing in figure 37,c.)

The clearance between the point and the shank limb varies greatly among the hooks. In small wooden hooks the clearance ranges from 3/16 to 3/8 inch, in the larger hooks from 1 1/16 to 3 1/2 inches. Kennedy states that the required clearance is equivalent to the thickness of the edgewise thumb with the point against the middle of the nail (19, p. 17). Four out of 12 hooks have approximately this clearance, four small hooks have less than this clearance (about 3/16 inch), four large hooks have a much greater clearance (up to 3 3/16 inches). Leaving aside the four smallest hooks used to catch smaller deep-sea fish, I presume that four of the remaining eight wooden hooks used for large deep-sea fish were probably made for ordinary fishermen, the other four for expert fishermen who prefer the hook with the wide clearance. Both types of hook, those with wide and those with narrow clearance, were in common use.

In several of the hooks the point is directed away from the medial longitudinal [322] line of the shank limb. Presumably the explanation for this in the Pukapukan hooks is the same as that given by Kennedy for Ellice Islands hooks (19, p. 16), that is, the manner in which the scarf surface was cut on the point limb, previously with an adz, today with knife or saw.

524 284 (7, 8), face of kite is punctured in longitudinal medial line and a trailer cord (9) is knotted to midrib over small wads of leaves (10) which prevent chafing of kite face. Size of kite: greatest width, 10 inches; height, 10 inches; length of tail, 3 feet. A second kite (C8098) is 9 inches wide, 10½ inches high. *b*, trick figure of coconut leaflet (*teonga a Mawi*): dried coconut leaflet 8 inches long, 1 inch wide slit three times longitudinally; section at each end of leaflet slit transversely so that leaflet consists of two sections, front and back, each bearing two thin strips; trick is to disengage two leaflet sections without breaking them. *c*, composite dart (*vele*) of *ngaya* wood (C8100): 1, haft 6 feet 2 inches long, average diameter ½ inch; 2, head (*ulutea*) of *ngangie* wood 1¾ inches long, ¾ inch in diameter at base; 3, stem 1½ inches long, ¼ inch in diameter, pointed and driven into pithy core of haft and lashed with 10 transverse turns (4) of fine two-ply twisted sisal cord; commencement and finishing ends buried; lashing holds *ulutea* head fast and prevents haft head from splitting. Most darts also lashed with transverse turns at proximal (5) end (*yiku*) of haft to prevent splitting of haft when thrown dart strikes ground. Above described dart is small; a more typical dart, examined in the field, was 7 feet 6 inches long, ½ inch in cross section, with an *ulutea* head 4½ inches long; butt end of dart was bound with sisal cord.

524 Kites (*kolilo*) are made of a *puapua* leaf stretched over a coconut leaflet midrib frame (fig. 49*d*). The tail (*kava*) is made of two dry coconut leaflets, the flying cord of strips of coconut midrib (*kalavu*). A circular faced kite is termed *kolilo ipu*; a semi-diamond shaped kite is termed *kolilo kalavalevu*.

The only tops in use are teetotum tops (*potehateka*). These are *taupulepule* shells (*Conus ebraeus*) which are spun (*takavilivili*) with a twirl of the fingers. The spinning point is termed *vulimuli*, the spun end, *ulu*. No game is played with these tops; they are used as toys only.

526 Throwing discs (*potehateka watu*) are made by rubbing down a piece of *punga* coral with another stone until the coral is roughly disc-shaped. Apparently no particular care is taken to produce a well-finished article. A rough disc seen in the field was 3¼ inches in diameter and between ¾ and 1 inch thick. To throw the disc is *wahapotehateka* or *wahatateka*.

Discs for the game of *tupa* are made of coconut shell. In a set of 12 (C8194), five discs are cut from the eye end of the shell, seven from the opposite end of the shell. The discs range in weight from 1 to 1½ ounces and in diameter from 3 to 3¼ inches. No particular pains have been taken over the discs. The surface of the shell is smooth, but not polished.

The dart (*tiku*) is made of *ngaya* wood:

526 322 Lengths of wood are cut from the bush and heated over a fire so that the green bark may be easily peeled from the wood. The dart is rubbed smooth between two pieces of coconut shell. The shorter dart (*puriku*, C8061) is about 2 feet long and ½ inch in diameter. The longer dart (*tiku*, C8062) is about 8 inches longer and of the same diameter. The darts are bluntly pointed at the proximal end; the distal end (the head) of one of the darts has been worn away from striking the ground. It is a matter of choice whether the player uses the short or the long dart.

The composite dart (*vele*, C8100) is made of *ngaya* wood with a head (*ulu tea*) of *ngangie* wood (fig. 49*c*):

1:Beaglehole and Beaglehole E-5 (1934-5)1938 Pukapukans

526 322 The wood is heated over a fire and the green bark peeled from it. The shaft is rubbed (*mukumuku*) smooth between two pieces of coconut shell and given a deep brown color by hanging in the rafters of a cook house above the smoke of cooking fires. Alternately the shaft may be decorated with spiral lines by stripping the bark from the shaft in a spiral about 1 inch wide running from butt to head and then hung over a cooking fire for some days, after which the remainder of the bark is peeled off leaving the shaft with a spiral of dark brown running down the length. A dart decorated in this way is termed *velo tutu*.

411 Darts are used as sporting equipment today. Some informants suggested that *velo* with sharply pointed heads might also have been used as weapons.

Figure 30.—Gong and drum. *a*, wooden slit gong (CB112): diameter from slot to bottom 3⅝ inches; cross section diameter 3⅛ by 4 inches; length of gong 17¼ inches; slot opening 12 inches long, 1 inch wide; beating stick (CB112) 10 inches long, ¾ inch diameter. A second gong (CB054) is smaller: diameter from slot to bottom 2 inches; cross diameters 3 inches by 2⅝ inches; length 16⅜ inches; slot opening 13 inches long; ¾ inch wide; beating stick (CB055) 12⅛ inches long, ⅝ inch diameter. The wood from which gongs are made is *tatea*, that of beaters *ngangie*. Bottom surfaces of both gongs slightly convex. *b*, shark-skin covered drum (*fuyu*) (CB201): drum 2 feet 9⅛ inches high, 10 inches top diameter, 9 inches bottom diameter, cut from solid block of coconut wood; inside top of drum hollowed out and an edge ½ inch wide and 2 inches deep cut around outside of top: 1, shark-skin cover (*mata hili mango*) laid on top of drum and circumference of skin folded over circular wooden binder (*tua kaweala*) of pandanus wood (2); skin shown cut away (8) to indicate wooden binder (9) beneath; 4, second wooden binder seized with three-ply sennit, placed on top of skin folded over first binder and pulled tight by three-ply sennit cord which starts as free end of seizing to second binder, passes down (4) around (5) one of legs (*uae*) and up again to second binder, under and over it and down again to second leg; lashing continues until second binder is held by cord passing around each leg; free end of lashing cord passes up from last leg and then around circumference of drum (6), making transverse turn around each oblique lashing; circumferential lashing finished off with overhand knots around last oblique lashing (7). The shark skin for this drum was cut too small and the turned-up circumference has been caught around first binder (2) with sewing of cotton thread. An alternate method of lashing skin to drum is to pass sennit lashing directly through holes in circumference of skin, passing lashing around legs as before; this method obviates the rather clumsy use of two circular wooden binders.

534 284

2: Macgregor E-2 (1933) 1935 Pukapukans
501, 322, 284

[Information in this source which is either inadequate, incorrect or duplication has only been filed in category 116: for description of canoes, their construction and lashings, see pp. 34-42.]